



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/553,405	11/10/2005	Dinand Lamberts	016782-0340	3705
22428	7590	01/04/2011	EXAMINER	
FOLEY AND LARDNER LLP			BERNSTEIN, DANIEL A	
SUITE 500				
3000 K STREET NW			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20007			3748	
			MAIL DATE	DELIVERY MODE
			01/04/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/553,405	LAMBERTS ET AL.
	Examiner	Art Unit
	DANIEL A. BERNSTEIN	3748

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 15 September 2010.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1,3-5,10-18,20-22 and 24-33 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1,3-5,10-18,20-22 and 24-33 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 17 October 2005 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsman's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____. | 6) <input type="checkbox"/> Other: _____ |

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 26 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Where R-base and R-transition are determined from a side of the membrane which faces the flames.

3. Claims 32 and 33 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. A first section, a second section, a first gas speed and a second gas speed were not originally disclosed in the specification. Also the distances as claimed in claim 33 were not originally disclosed in the specification.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 33 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The distances as claimed in claim 33 are unclear and there is

insufficient explanation in the specification to understand what the applicant is attempting to claim.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

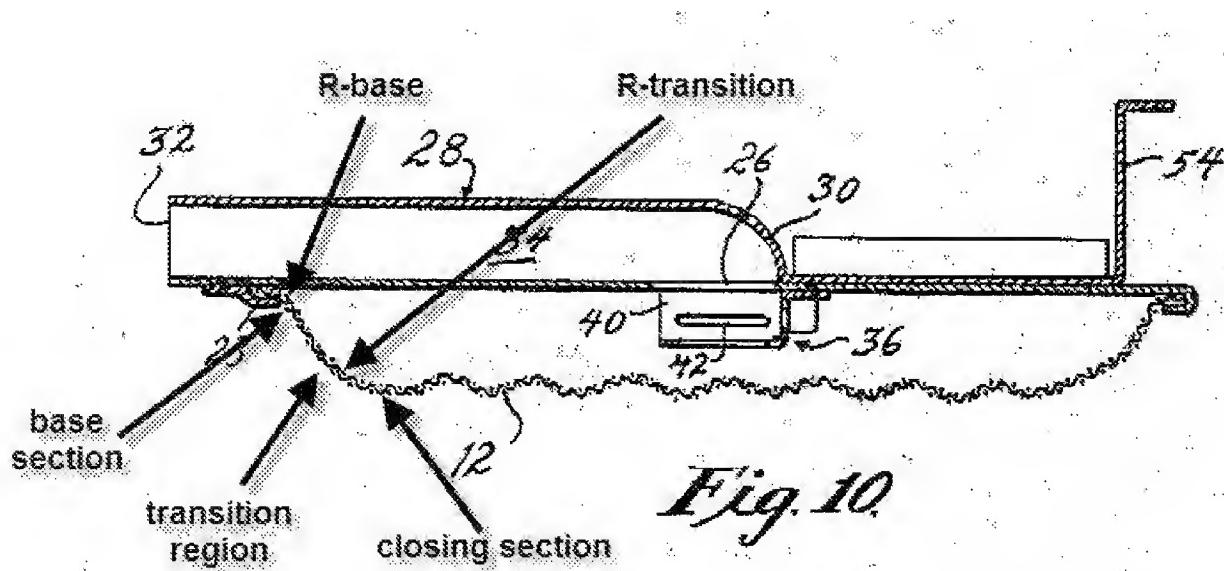
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim 29, 32 and 33 rejected under 35 U.S.C. 102(b) as being anticipated by US 3,360,028 to Saponara et al.

In regards to claim 29, Saponara shows a method of operating a gas burner, comprising: penetrating gas through a metal burner membrane before igniting the gas (gas penetrates the screen or metal membrane 12 before being ignited when it is exposed to ambient air. Saponara teaches that the screen 12 is a "combustion sustaining surface" and that gas flows from the conduit through the screen 12 where the fuel meets combustion air. Clearly, the gas penetrates the metal burner membrane before combustion due to the fact that there is no premixing of fuel and combustion air before the fuel penetrates the membrane), the membrane having a surface that is uninterrupted (the surface of the membrane 12 is uninterrupted as shown in Fig. 10); igniting the gas such that visible flames having a lower flame front (the flame front of Fig. 12 will vary in size based upon the shape of the membrane. Where the membrane is curved causing denser holes in the mesh there will be a lower flame front due to more restrictive flow of fuel) where the gas initially ignites outside the membrane are

Art Unit: 3748

produced; and modulating gas speed through the membrane over the surface of the membrane (due to the nature of a steel or wire mesh, when the mesh is bent and shaped there will be regions where the holes in the mesh will become less or more restrictive to the flow of gas. This behavior of steel or wire mesh is inherent and very well known to someone of ordinary skill in the art. In this case, due to the shape of the transition region (being bent over) the speed of gas will be slower due to a more restrictive region than that of the base section where the holes in the mesh are less restrictive, see annotated Fig. 10) by changing a smallest radius of curvature at different sections of the membrane.



In regards to claim 32, Saponara shows that a first section (transition region, annotated Fig. 10) of the membrane has a first smallest radius (the transition region has the smallest radius of curvature which will result in a more concentrated restrictive mesh and therefore a lower flame front) of curvature that results in a first gas speed (lower

gas speed due to more restrictive flow) through the membrane, wherein a second section (closing section, annotated Fig. 10) of the membrane has a second smallest radius (the closing section has a larger radius of curvature than the transition region and therefore a higher gas speed due to less restrictive flow through the mesh) of curvature that results in a second gas speed through the membrane, and wherein the first gas speed is less than the second gas speed (the gas speed through the transition region will inherently be less than the gas speed through the closing section due to a more restrictive mesh density).

In regards to claim 33, Saponara shows that a distance (the flame front distance will be shorter near the transition region inherently) between the lower flame front and the first section is smaller than a distance between the lower flame front and the second section (the flame front of the transition region is closer to the transition region than it is to the closing region).

DETAILED ACTION

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 1, 5, 10-18, 22, 24-28 and 30 rejected under 35 U.S.C. 103(a) as being unpatentable over US 3,360,028 to Saponara et al in view of US 6,149,424 to Marrecau et al.

In regards to claim 1, Saponara discloses a gas burner (infrared gas burner, Fig. 12), comprising: a metal burner membrane (metal burner membrane 12) configured such that, during use, gas penetrates (gas penetrates the screen 12 before being ignited when it is exposed to ambient air. Saponara teaches that the screen 12 is a "combustion sustaining surface" and that gas flows from the conduit through the screen 12 where the fuel meets combustion air. Clearly, the gas penetrates the metal burner membrane before combustion due to the fact that there is no premixing of fuel and combustion air before the fuel penetrates the membrane) before being ignited and resulting in visible flames (the flames would be visible on the outside of burner membrane 12, Fig. 10, since Saponara describes the apparatus as a surface burner, meaning combustion does not occur within the membrane but rather on the surface of the membrane once fuel has penetrated the membrane) having a lower flame (due to the shape of the undulate membrane of Fig. 10, the lower flame front will occur at the bends of the membrane) front where the gas initially ignites outside said membrane, wherein said membrane comprises a fabric (12 is a metal mesh fabric).

Saponara also discloses that said membrane of the gas burner comprises a base section (base section at 23, Fig. 10) having a smallest radius (the smallest radius of curvature occurs at the bend near 23. Also see R-base in annotated Fig. 10) of curvature being R-base, a closing section (closing section, annotated Fig. 10), and a transition region (transition region, annotated Fig. 10) connecting said base section to said closing section (the transition region connects the base section with closing section as shown in annotated Fig. 10), wherein said membrane is uninterrupted (the membrane 12 is continuous and uninterrupted), and wherein said transition region has a smallest radius of curvature rtransition (R-transition, annotated Fig. 10).

Saponara fails to disclose that the metal mesh fabric comprises stainless steel fibers and that said transition region has a smallest radius of curvature R-transition being larger than or equal to $0.02 \times R_{base}$ and being smaller than or equal to $0.7 \times R_{base}$.

Marrecau discloses an undulated burner membrane in which said membrane comprises a fabric comprising stainless steel fibers (the membrane 16 is made of stainless steel, see Fig. 1) for the purpose of being resistive to high temperature.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine Saponara with Marrecau for the purpose of making the mesh membrane of Saponara out of stainless steel mesh so that the membrane can resist high temperatures. Stainless steel mesh is well known to someone of ordinary skill in the art to be highly malleable and resistive to high temperatures which make stainless steel mesh an ideal material for radiant burner

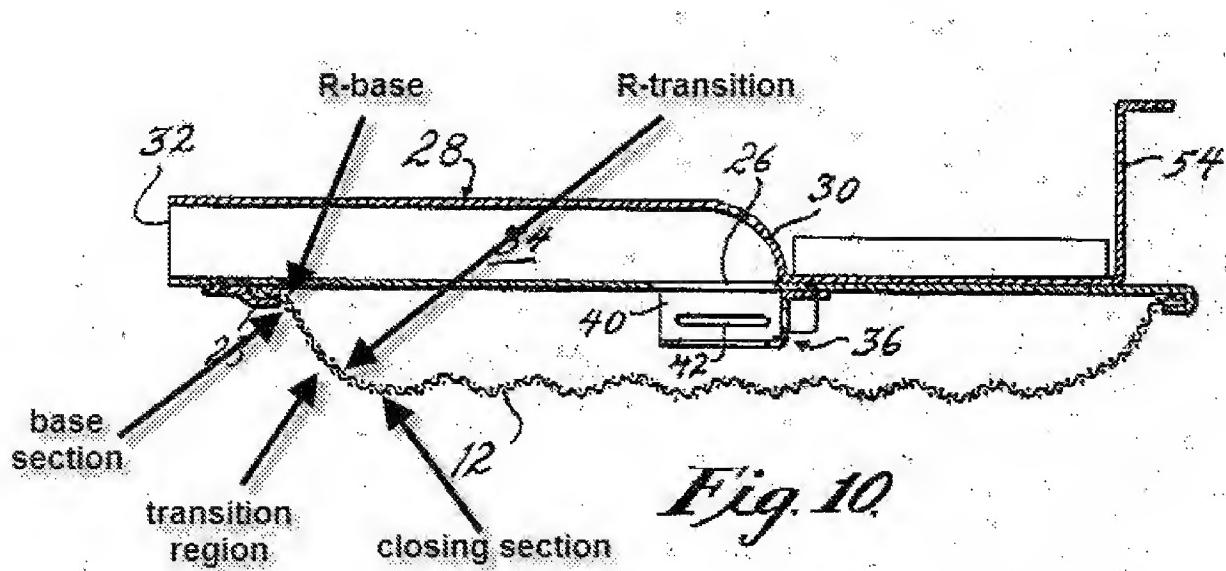
screens. Therefore, it would have been obvious to combine Saponara with Marrecau so that the mesh screen of Saponara could better resist thermal cycling, thus prolonging the life of the mesh screen.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to optimize the range of the transition radius of curvature of Saponara for the purpose of optimizing the flame shape and heat output range of the burner. It is well known to someone of ordinary skill in the art that a burner membrane with a cross section of a dome or concave shape contour encourages the upward flow of the products of combustion and thus insures continued efficient combustion so that the burner does not extinguish due to oxygen depletion near the burner membrane as evidenced by Saponara. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the dimensions including the range of the R-base and R-transition in order to modify the shape and heat characteristics of the burner. Optimizing the range and curvature of the membrane would be well within the capabilities of someone of ordinary skill in the art and would not have led to undue experimentation at the time of the invention. Furthermore, changing the pattern or shape of the burner membrane would be recognized as a result-effective variable, meaning that the workable range of the dimensions would achieve a recognized result through routine experimentation.

The applicant has not provided sufficient evidence why the claimed range is non-obvious over the prior art of record.

Also, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). (MPEP 2114).

Clearly, the apparatus of Saponara contains all the claimed features of the applicant's invention. The only discernable distinction between the prior art and this instant application is the specific range of the dimensions and the material choice for the membrane. It is the examiner's opinion that merely changing the dimensions of the prior art and selecting a material choice for the membrane is not grounds for allowance.



In regards to claim 5, Saponara in view of Marrecau discloses that the membrane further comprises a foraminated plate, a foraminated sheet, or a deep drawn or stamped wire mesh (the membrane of Saponara is a wire mesh, Col. 1 lines 55-56) for supporting said fabric.

In regards to claim 10, Saponara in view of Marrecau fails to disclose that the base section has a shape of a conical surface of a frustum of a cone.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to change the shape of base section of Saponara so that the base section has a conical surface of a frustum of a cone according to In re Dailey (In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966)). According to In re Dailey, it is obvious to change the shape of an apparatus when there is no evidence that the particular change in shape (a frustoconical base) is significant. The applicant has made no assertion in the specification that the shape of the base has any significant affect on the function of the apparatus. Therefore, it would have been obvious at the time of the invention to one of ordinary skill in the art to change the shape of the base of Saponara to a frustoconical shape.

In regards to claim 11, Saponara in view of Marrecau discloses a gas burner as in claim 5, wherein said base section has a cylindrical shape (Fig. 3 shows at least part of the base section being of a cylindrical shape).

In regards to claims 12 and 17, Saponara in view of Marrecau fails to disclose that said transition region is part of a torus surface delimited by two planes perpendicular to an axis of symmetry of said torus surface.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to change the shape of the transition region of Saponara so that the transition region has a torus surface delimited by two planes perpendicular to an axis of symmetry according to In re Dailey (In re Dailey, 357 F.2d 669, 149 USPQ

47 (CCPA 1966)). According to In re Dailey, it is obvious to change the shape of an apparatus when there is no evidence that the particular change in shape is significant. The applicant has made no assertion in the specification that the shape of the transition region has any significant affect on the function of the apparatus. Therefore, it would have been obvious at the time of the invention to one of ordinary skill in the art to change the shape of the transition region of Saponara to a torus surface delimited by two planes perpendicular to an axis of symmetry.

In regards to claim 13, Saponara in view of Marrecau fails to disclose that said base section has a polygonal cross section, the comers of said cross section being rounded (Saponara teaches rounded corners, see Fig. 10).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to change the shape of base section of Saponara so that the base section has a polygonal cross section according to In re Dailey (In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966)). According to In re Dailey, it is obvious to change the shape of an apparatus when there is no evidence that the particular change in shape is significant. The applicant has made no assertion in the specification that the shape of the cross section of the base has any significant affect on the function of the apparatus. Therefore, it would have been obvious at the time of the invention to one of ordinary skill in the art to change the shape of the base of Saponara to a polygonal cross section.

In regards to claim 14, Saponara in view of Marrecau fails to disclose that said base section has a rectangular cross section, the corners of said cross section being rounded (Saponara teaches rounded corners, see Fig. 10).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to change the shape of base section of Saponara so that the base section has a rectangular cross section according to In re Dailey (In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966)). According to In re Dailey, it is obvious to change the shape of an apparatus when there is no evidence that the particular change in shape is significant. The applicant has made no assertion in the specification that the shape of the cross section of the base has any significant affect on the function of the apparatus. Therefore, it would have been obvious at the time of the invention to one of ordinary skill in the art to change the shape of the base of Saponara to a rectangular cross section.

In regards to claim 15, Saponara in view of Marrecau fails to disclose that said base section is a truncated pyramid, said pyramid having rounded edges (Saponara teaches rounded edges, see Fig. 10).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to change the shape of base section of Saponara so that the base section has is a truncated pyramid according to In re Dailey (In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966)). According to In re Dailey, it is obvious to change the shape of an apparatus when there is no evidence that the particular change in shape is significant. The applicant has made no assertion in the specification that the

shape of the base section has any significant affect on the function of the apparatus.

Therefore, it would have been obvious at the time of the invention to one of ordinary skill in the art to change the shape of the base section of Saponara to a truncated pyramid.

In regards to claim 16, Saponara in view of Marrecau discloses that said closing section is a small inverted sphere cap (see annotated Fig. 10 where the closing section has the shape of a small inverted sphere cap which forms a depression at a center of the membrane between the first and second undulation) such that a depression forms at a center of said burner membrane.

Furthermore, It would have been obvious to one of ordinary skill in the art to modify the shape of the closing section according to In re Dailey (see above for obviousness rationale).

In regards to claim 18, Saponara in view of Marrecau discloses that said transition region is in a form of a circular ridge (see annotated Fig. 10 where the transition region has the shape of a circular ridge).

Furthermore, It would have been obvious to one of ordinary skill in the art to modify the shape of the transition region according to In re Dailey (see above for obviousness rationale).

In regards to claim 22, Saponara in view of Marrecau fails to disclose that the smallest radius of curvature R-base of the base section and the smallest radius of curvature R-transition of the transition region follow the following relation: $0.02 \times R\text{-base} \sim R\text{-transition} \sim 0.35 \times R\text{-base}$.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to optimize the range of the transition radius of curvature of Saponara for the purpose of optimizing the flame shape and heat output range of the burner. It is well known to someone of ordinary skill in the art that a burner membrane with a cross section of a dome or concave shape contour encourages the upward flow of the products of combustion and thus insures continued efficient combustion so that the burner does not extinguish due to oxygen depletion near the burner membrane as evidenced by Saponara. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the dimensions including the range of the R-base and R-transition in order to modify the shape and heat characteristics of the burner. Optimizing the range and curvature of the membrane would be well within the capabilities of someone of ordinary skill in the art and would not have led to undue experimentation at the time of the invention. Furthermore, changing the pattern or shape of the burner membrane would be recognized as a result-effective variable, meaning that the workable range of the dimensions would achieve a recognized result through routine experimentation.

The applicant has not provided sufficient evidence why the claimed range is non-obvious over the prior art of record.

Also, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). (MPEP 2114).

In regards to claim 24, Saponara in view of Marrecau fails to disclose that the smallest radius of curvature R-base of the base section and the smallest radius of curvature R-transition of the transition region follow the following relation: $0.09 \times R\text{-base} \sim R\text{-transition} \sim 0.7 \times R\text{-base}$.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to optimize the range of the transition radius of curvature of Saponara for the purpose of optimizing the flame shape and heat output range of the burner. It is well known to someone of ordinary skill in the art that a burner membrane with a cross section of a dome or concave shape contour encourages the upward flow of the products of combustion and thus insures continued efficient combustion so that the burner does not extinguish due to oxygen depletion near the burner membrane as evidenced by Saponara. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the dimensions including the range of the R-base and R-transition in order to modify the shape and heat characteristics of the burner. Optimizing the range and curvature of the membrane would be well within the capabilities of someone of ordinary skill in the art and would not have led to undue experimentation at the time of the invention. Furthermore, changing the pattern or shape of the burner membrane would be recognized as a result-effective variable, meaning that the workable range of the dimensions would achieve a recognized result through routine experimentation.

The applicant has not provided sufficient evidence why the claimed range is non-obvious over the prior art of record.

Also, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). (MPEP 2114).

In regards to claim 25, Saponara in view of Marrecau fails to disclose that the smallest radius of curvature R-base of the base section and the smallest radius of curvature R-transition of the transition region follow the following relation: $0.18 \times R\text{-base} - R\text{-transition} \sim 0.35 \times R\text{-base}$.

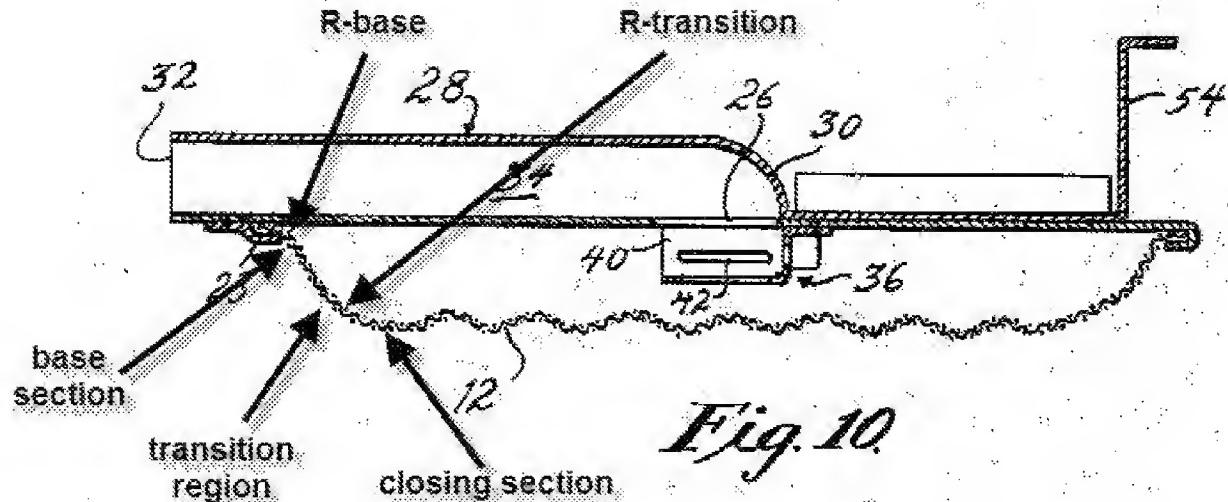
It would have been obvious at the time the invention was made to a person having ordinary skill in the art to optimize the range of the transition radius of curvature of Saponara for the purpose of optimizing the flame shape and heat output range of the burner. It is well known to someone of ordinary skill in the art that a burner membrane with a cross section of a dome or concave shape contour encourages the upward flow of the products of combustion and thus insures continued efficient combustion so that the burner does not extinguish due to oxygen depletion near the burner membrane as evidenced by Saponara. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the dimensions including the range of the R-base and R-transition in order to modify the shape and heat characteristics of the burner. Optimizing the range and curvature of the membrane would be well within the capabilities of someone of ordinary skill in the art and would not have led to undue experimentation at the time of the invention. Furthermore, changing the pattern or shape of the burner membrane would be recognized as a result-effective variable,

meaning that the workable range of the dimensions would achieve a recognized result through routine experimentation.

The applicant has not provided sufficient evidence why the claimed range is non-obvious over the prior art of record.

Also, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). (MPEP 2114).

In regards to claim 26, Saponara in view of Marrecau discloses that the smallest radius of curvature R-base (R-base, see annotated Fig. 10) of the base section and the smallest radius of curvature R-transition (R-transition, see annotated Fig. 10) of the transition region are determined from a side of the membrane which faces the flames (the smallest radius of both the base and transition region can be determined from the top side of the membrane).



In regards to claim 26, Saponara in view of Marrecau discloses a gas burner as in claim 1, wherein the smallest radius of curvature R_{base} (base of undulated membrane, see Fig. 3, Saponara) of the base section and the smallest radius of curvature $r_{transition}$ (curved portion that connects the base and closing section as shown in Fig. 3) of the transition region are determined from a side of the membrane which faces the flames (the smallest radius of both the base and transition region can be determined from the top side of the membrane).

In regards to claim 27, Saponara in view of Marrecau discloses that the base section and the transition region are configured such that gas speed through the transition region is lower compared to gas speed through the base section (due to the nature of a steel or wire mesh, when the mesh is bent and shaped there will be regions where the holes in the mesh will become less or more restrictive to the flow of gas. This behavior of steel or wire mesh is inherent and very well known to someone of ordinary

skill in the art. In this case, due to the shape of the transition region (being bent over) the speed of gas will be slower due to a more restrictive region than that of the base section where the holes in the mesh are less restrictive, see annotated Fig. 10). .

In regards to claim 28, Saponara in view of Marrecau discloses that the membrane only has a single transition region connecting a single base section to a single closing section (annotated Fig. 1 shows a single base section connected to a single transition region and a single closing section).

In regards to claim 30, Saponara fails to disclose that the membrane comprises a fabric comprising stainless steel fibers.

Marrecau discloses an undulated burner membrane in which said membrane comprises a fabric comprising stainless steel fibers (the membrane 16 is made of stainless steel, see Fig. 1) for the purpose of being resistive to high temperature.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine Saponara with Marrecau for the purpose of making the mesh membrane of Saponara out of stainless steel mesh so that the membrane can resist high temperatures. Stainless steel mesh is well known to someone of ordinary skill in the art to be highly malleable and resistive to high temperatures which make stainless steel mesh an ideal material for radiant burner screens. Therefore, it would have been obvious to combine Saponara with Marrecau so that the mesh screen of Saponara could better resist thermal cycling, thus prolonging the life of the mesh screen.

11. Claim 31 rejected under 35 U.S.C. 103(a) as being unpatentable over Saponara et al.

In regards to claim 31, Saponara discloses that the membrane of the gas burner comprises a base section (base section, annotated Fig. 10) having a smallest radius (smallest radius of curvature R-base, annotated Fig. 10) of curvature being Rbase, a closing section (closing section, annotated Fig. 10), and a transition region (the transition region connects the base section to the closing section as shown in annotated Fig. 10) connecting the base section to the closing section.

Saponara fails to disclose that the transition region has a smallest radius of curvature R-transition being larger than or equal to $0.02 \times R\text{-base}$ and being smaller than or equal to $0.7 \times R\text{-base}$.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to optimize the range of the transition radius of curvature of Saponara for the purpose of optimizing the flame shape and heat output range of the burner. It is well known to someone of ordinary skill in the art that a burner membrane with a cross section of a dome or concave shape contour encourages the upward flow of the products of combustion and thus insures continued efficient combustion so that the burner does not extinguish due to oxygen depletion near the burner membrane as evidenced by Saponara. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the dimensions including the range of the R-base and R-transition in order to modify the shape and heat characteristics of the burner. Optimizing the range and curvature of the membrane would be well within the

capabilities of someone of ordinary skill in the art and would not have led to undue experimentation at the time of the invention. Furthermore, changing the pattern or shape of the burner membrane would be recognized as a result-effective variable, meaning that the workable range of the dimensions would achieve a recognized result through routine experimentation.

The applicant has not provided sufficient evidence why the claimed range is non-obvious over the prior art of record.

Also, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). (MPEP 2114).

Clearly, the apparatus of Saponara contains all the claimed features of the applicant's invention. The only discernable distinction between the prior art and this instant application is the specific range of the dimensions and the material choice for the membrane. It is the examiner's opinion that merely changing the dimensions of the prior art and selecting a material choice for the membrane is not grounds for allowance.

12. Claims 3, 4, 20 and 21 rejected under 35 U.S.C. 103(a) as being unpatentable over Saponara in view of Marrecau and US 6,065,963 to Dewaegheneire.

In regards to claim 3, Saponara in view of Marrecau discloses a gas burner as in claim 1, but does not teach wherein said stainless steel fibers are arranged essentially parallel into bundles.

Dewaegheneire teaches a conical surface burner with a membrane (2, Fig. 1) that comprises stainless steel fibers that are arranged essentially parallel into bundles (Col. 2 lines 7-17).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine Saponara with Dewaegheneire for the purpose of providing the burner of Saponara with a perforated metal fabric membrane made out of stainless steel in which the stainless steel fibers were arranged essentially parallel into bundles. This would have been an obvious design choice, because there are only so many known methods of arranging stainless steel into bundles and a parallel configuration is well known to someone of ordinary skill in the art as evidenced by Dewaegheneire. Therefore, it would have been obvious to combine Marrecau with Dewaegheneire, because the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. It also would have been obvious to combine Saponara with Dewaegheneire in order to increase the strength and durability of the metal mesh fabric.

In regards to claim 4, Saponara in view of Marrecau and Dewaegheneire discloses a gas burner as in claim 3, wherein said bundles are knitted or braided or woven (Dewaegheneire, Col. 1 lines 5-6).

In regards to claims 20 and 21, Saponara in view of Marrecau discloses that the membrane further comprises a foraminated plate, a foraminated sheet, or a deep drawn or stamped wire mesh (the membrane of Saponara is a wire mesh, Col. 1 lines 55-56) for supporting said fabric.

Response to Arguments

13. Applicant's arguments with respect to claims 1, 3-5, 10-18, 20-22 and 24-26 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL A. BERNSTEIN whose telephone number is (571)270-5803. The examiner can normally be reached on Monday-Friday 8:00 AM - 5:00 PM EDT.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Denion can be reached on 571-272-4859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DAB

Application/Control Number: 10/553,405
Art Unit: 3748

Page 24

/Kenneth B Rinehart/
Supervisory Patent Examiner, Art Unit 3743